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▶ The Neuro-Maturation Process

- ▶ There are five basic developmental stages or benchmarks that children go through from ages birth to about 24-26 years old.
- ▶ The benchmarks can overlap

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Class Objectives

- Understand normal brain development
- Define adverse childhood experiences
- Be able to identify ACEs are
- Understand the impact of ACEs
- Be able to explain the trauma response
- Identify good "buffers"

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Adverse Childhood Experiences & Neurobiology of Trauma

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- 2- to 5-year-old
- Identify objects and people like mommy and daddy.
- Important people grandma and grandpa.
- Develop a sense of family

Stage Two

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- ▶ Birth to around 3-year-old
- ▶ Color, sound, light, texture and taste

Stage One

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- Kids observe and hear everything, they are like sponges that get information and ideas from TV, listening to others and watching other children and adults.
- They learn to mimic adult behaviors

Through All Five Stages

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Stage Four

- ▶ 7 to 14 years of age
- ▶ Start of physical maturity
- ▶ Start of psychological maturity
- ▶ Start to understand the big scheme of things
- ▶ Define character and personality
- ▶ Teenager stage

Teen brain

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Stage 3

- Children are in elementary school
- Socializing skills start to develop and the ability to deal with disappointments and conflict

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Stage Three

- 4 to 10 years of age
- Children have begun to understand order
- Sort objects and people out
- Start to figure out importance of purpose and life

concrete

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Stage Five

- 12 to 24 years of age
- Puberty ends between 22 and 24 years
- Understanding spiritually
- Understanding beyond self
- Develop social identity
- High school and college years

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• What do teens think, do they hear and see what adults see and act the same way?

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Maturation is a Process

Stage 4

Elementary and Junior high school

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Brain Trivia

- Looks like a walnut
- Feels like tofu
- Has over 3 million miles of nerve connections
- One trillion nerve cells

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Human Brain

Photograph by Fred H. Mazer, M.D.

The human brain is a 3-pound (1.4-kilogram) mass of jelly-like fats and tissues—yet it's the most complex of all known living structures. Up to one trillion nerve cells work together and coordinate the physical actions and mental processes that set humans apart from other species.

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Maturation is a Process

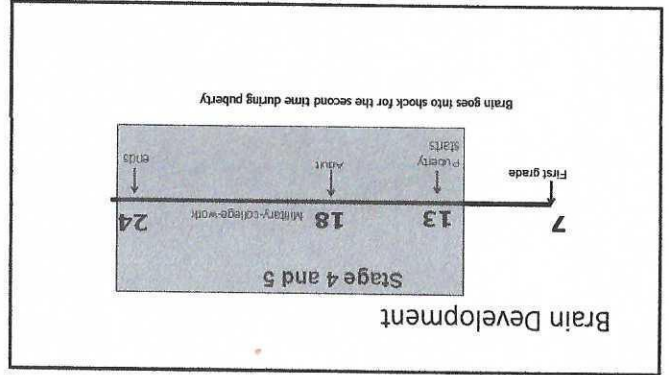
Stage 5

12-14 18 22-24

↓ ↓ ↓

Legal ADULT

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► During stage 4 and 5 of brain development your brain gets a "hardware" and "software" update

► These are critical changes that allow maturation, remember it is a process

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If you counted all the neurons in your brain at the rate of one a second... it would take more than 3000 years

From Binkley April 2017, BBC, Health

ACEs 2

- Adverse Childhood Experiences (ACEs) are stressful or traumatic events that children experience before age 18, such as violence at home, neglect, abuse, or having a parent with mental illness or substance dependence.

ACEs 1

Adverse Childhood Experiences (ACEs)

- In child development we all have
- Good experiences
- Bad experiences

- Personalities settle in 8 to 11 ish years of age.
- Choosing a positive social identity is a partially a function of parents....
- But how many of you know parents that want to be their children's friend, rather than a parent?

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ACE CATEGORIES- NEGLECT

- 4. Physical
- 5. Emotional

ACES 1

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ACE CATEGORIES- ABUSE

- 1. Physical
- 2. Emotional
- 3. Sexual

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ACE CATEGORIES- GENERAL

- There are three general categories and a total of 10 ACE factors:
- ABUSE
- NEGLECT
- HOUSEHOLD DYSFUNCTION

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ACE Data

- Economic hardship and divorce or separation of a parent or guardian are the most common ACEs reported nationally, and in all states.
- Just under half (45 percent) of children in the United States have experienced at least one ACE, which is similar to the rate of exposure found in a 2011/2012 survey.
- * In Arkansas, the state with the highest prevalence, 56 percent of children have experienced at least one ACE.

https://www.aceinquiry.org/about/faq/

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- High or frequent exposure to ACEs, without the buffering support of a caring adult, can dysregulate children's stress response and impact normal brain development

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ACE CATEGORIES- HOUSEHOLD DYSFUNCTION

- 6. Parental mental illness
- 7. Incarcerated relative
- 8. Mother treated violently
- 9. Household substance abuse.
- 10. Not being raised by both biological parents

ACEs can cause stress reactions in children, including feelings of intense fear, terror, and helplessness.

- When activated repeatedly or over a prolonged period of time (especially in the absence of protective factors), toxic levels of stress hormones can interrupt normal physical and mental development and can even change the brain's architecture.

Nationally

- Children with the lowest ACEs within the Asian NH populations
- Like drug consumption trends, ACEs in the US have regional characteristics

https://www.cdc.gov/ncjrs/pdffiles/200820.pdf#page=10&view=scrollable&zoom=100

ACE Data

- One in ten children nationally has experienced three or more ACEs, placing them in a category of especially high risk.
- In five states—Arizona, Arkansas, Montana, New Mexico, and Ohio—as many as one in seven children had experienced three or more ACEs.
- Children of different races and ethnicities do not experience ACEs equally. Nationally, 61 percent of black non-Hispanic children and 51 percent of Hispanic children have experienced at least one ACE, compared with 40 percent of white non-Hispanic children and only 23 percent of Asian non-Hispanic children.

https://www.cdc.gov/ncjrs/pdffiles/200820.pdf#page=10&view=scrollable&zoom=100

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Toxic Stress Can Change Our Bodies

- What is unhealthy or "toxic" stress in children?
- Normal, positive stress can be anxiety associated with everyday experiences like getting frustrated, starting at a new daycare or getting shots at the doctor's.

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Health and Behavior Issues

- If left untreated, toxic stress (ACEs) can lead to lifelong health problems like heart disease or cancer.
- It also can lead to mental health issues such as depression, anxiety, substance abuse, or suicide.

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Health and Behavior Issues

- Children exposed to ACEs are more likely to develop learning difficulties and other health problems like asthma or sleep disturbances.
- They may also have difficulty sitting still in school or controlling emotions in challenging situations.

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Trauma Response

- However, a problem occurs when our system is always "on" – overtaxed by repeated, intense, or chronic stress.
- The cascade of chemicals and reactions can go from protecting our lives to damaging our physical/mental health, genetics and brain development

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Trauma Response

- When activated occasionally, this "fight or flight" system bypasses the logical decision-making part of our brain – the prefrontal cortex – and activates the primitive reactions that can protect us from threats.
- In occasional situations like this, stress is helpful.


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Toxic Stress Can Change Our Bodies

- A child's body releases emergency stress chemicals (brain soup), including adrenaline and cortisol, which causes her heart to quicken and her eyes to dilate.
- Normal stress is part of a child's healthy development.

• NERVOUS SYSTEM

- Disruption to the developing brain, including changes to the hippocampus, prefrontal cortex and amygdala, may lead to an increase in risk of cognitive impairment, attention deficits, learning disabilities, hyperactivity, self-regulation, memory and attention, and anxiety.




Economic Harvard

- Exposure to intense, frequent, or sustained stress without the buffering care of a supportive adult, can change children's brains and bodies, including disrupting learning, behavior, immunity, growth, hormonal systems, immune systems, and even the way DNA is read and transcribed.
- This exposure can lead to

Toxic stress


- If left unaddressed, toxic stress can negatively affect a developing body and brain by disrupting learning, behavior, immunity, growth, and even the way DNA is read and transcribed.

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- **ENDOCRINE SYSTEM**
- Toxic stress can impact growth and development. It can also lead to obesity and changes in the timing of puberty, as well as other issues.

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- **IMMUNE SYSTEM**
- Higher risk of infection and autoimmune disease may occur due to chronic inflammation and other factors, which cause changes in the body's natural immune defense responses.

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- **CARDIOVASCULAR SYSTEM**
- Toxic stress can increase a person's risk of developing high blood pressure, elevating levels of inflammation that can damage the arteries. These conditions can lead to heart disease, stroke and other serious health issues later in life.

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One of the most common signs of toxic stress in children is behavioral problems.

- In young children this can manifest as crying more than usual, becoming extra clingy, regressing to bed wetting or baby talk, or developing new fears.

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What is toxic stress?

- If left unaddressed, toxic stress can affect growth, learning, behavior, immunity and even the way DNA is read and transcribed.

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What is toxic stress?

- The toxic stress response can occur when a child experiences strong, frequent, and/or prolonged adversity—such as physical or emotional abuse, chronic neglect, caregiver substance abuse or mental illness, exposure to violence, and/or the accumulated burdens of family economic hardship—without adequate adult support.

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Trauma

Comes in many forms:

- Physical
- Sexual
- Emotional
- Psychological
- Family

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CAN CHILDREN OVERCOME THE EFFECTS

- Children at risk may not exhibit behavioral symptoms but that does not mean their brains and bodies are not being affected by toxic stress.
- The higher your ACE score, the higher the likelihood of developing long-term health problems like heart disease, stroke, cancer, and diabetes.
- In the long term, exposure to ACEs can also lead to serious health conditions like heart disease, stroke, and cancer later in life.

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- In older children, behavioral symptoms could include learning difficulties, juvenile offending, substance abuse, suicidality, and risky sexual behavior.
- Children exposed to ACEs may also exhibit physical health issues like asthma, sleep disturbances, frequent infections, frequent headaches or stomach aches.

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Poverty

- Less likely to attend college
- Less likely to be employed
- Greater chance of being in the criminal justice/medical/mental health systems

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- Brain development is a process, outside influences can affect this process like: Living conditions, Poverty, Resources
- Children who live in poverty tend to reform worst than peers in school
- They are less likely to graduate from high school

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Class exercise

- Who were your role models and who acted as mentors to you?
- Parents program their children's brains
- Care takers are the master programmers

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▶ During times of stress the brain soup prevents proper memory encoding or consolidation

▶ The brain senses danger takes over to allow you to survive and unconsciously you decide to....

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Trauma and the Brain

- When faced with danger, the brain goes on automatic (reptilian brain takes over)
- When normal: the cortex works with the hippocampus in the limbic system

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Neuro-Biology of Trauma

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• We must understand that when we experience trauma it is BOTH a physiological and psychological event.

• Without this understanding healing is almost impossible

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The freeze response

- There are two types of freeze responses:
 - Tonic immobility
 - Collapsed immobility

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When This Happens

- A chemical brain soup allows us to do one of the three responses...but at a cost. This is an instinctual action



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• Implicit memory is sometimes referred to as unconscious memory or automatic memory.
 • Implicit memory uses past experiences to remember things without thinking about them.

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Implicit / Emotional Memory

- Emotional
- Rapid
- Unconscious processing
- Pattern recognition
- Automatic
- Crude
- Fragmented
- Images
- Emotions

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• How do small children express these experiences?
 • Commonly through behaviors

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Brain Soup

- ▶ This soup cause the frontal lobe and hippocampus to not function properly
- ▶ Decision making stops
- ▶ Body just reacts/instinctual
- ▶ Normal memory encoding stops/ emotional memory happens

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The "Brain Soup" Appears

- Catecholamine (Adrenaline)
- Cortisol (for energy, also the stress hormone)
- Opiates (prevent pain)
- Oxytocin and dopamine (promotes good feelings)

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Amygdala

- When trauma happens the amygdala signals fear.
- Immediately this activates the brain and there is a flood of norepinephrine, dopamine and....

Davidson, 2002

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- The victims of trauma may not fight or have the flight response
- This does not mean the trauma response is not activated...IT IS

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- ▶ Victims will have illogical decision making (failure of: if then thinking)
- ▶ May have a flat affect
- ▶ Strange emotions
- ▶ Emotional swings
- ▶ Physical problems

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- What happens to us when we experience trauma
- Imagine if you are a child and experience trauma over and over
- Or you witness (see and/or hear) trauma over and over

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Effects of alcohol

- High doses impair hippocampus-mediated encoding and consolidation of BOTH encoding of memory and sensations

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Impact of Trauma on Memory

- Fragmented explicit memories
- Sleep cycles important
- Memory better after one sleep cycle
- Some practitioners wait 3 sleep cycles before debriefing

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Impact on Victim

- ▶ Self judgement
- ▶ Negative or questioned responses by others wo expected a different reaction
- ▶ Lack of a response is misinterpreted as cooperation

Carpwell & Robinson, 2011

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Tonic immobility

- Uncontrollable response (no perceived escape)
- 12-50% of rape victims have this response
- Increased breathing, rigid or trembling muscles
- The same is true for sexual abuse victims

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Tonic immobility

- Criminal cases have been closed or not filed because during sexual assault, the victim does not fight/struggle.
- THE REAL REASON IS TONIC IMMOBILITY

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Freeze/immobility

- Happens when there is no (perceived) escape, so the brain survival default mode is to freeze
- This is a trauma response

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Collapsed immobility

- Some people report feeling "sleepy" and some even will fall asleep even though a traumatic event has just occurred

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Collapsed immobility

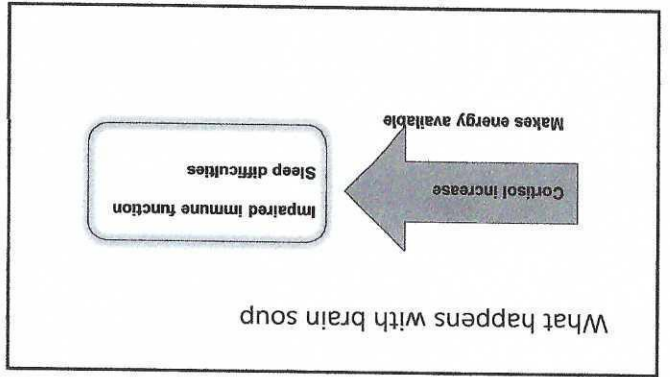
- Automatic and reflexive, less common than tonic immobility
- Cannot speak or move
- Loss of muscle tone, collapse
- Person can become faint and may pass out

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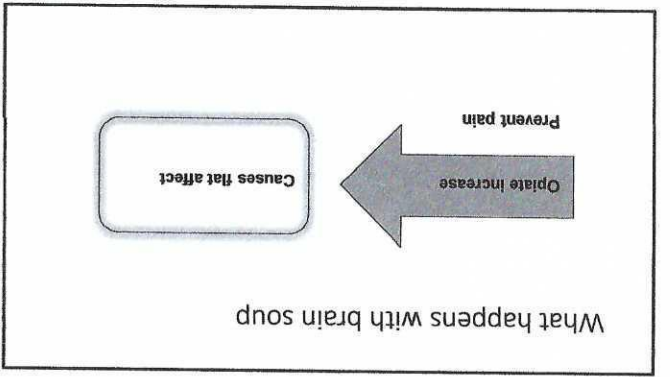
Tonic immobility

- ▶ Paralysis, numbness or insensitivity to pain
- ▶ Eye closure or fixation on an object
- ▶ Multiple abuse victims more common

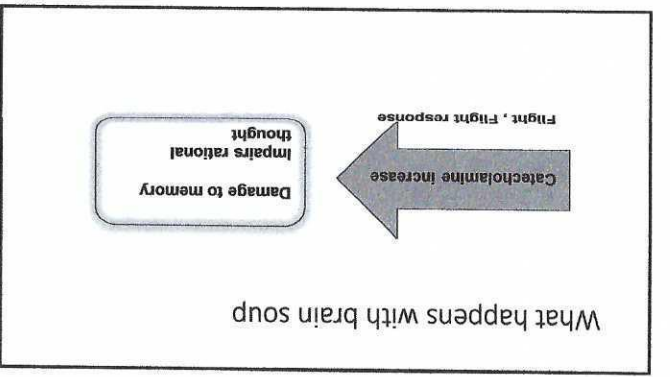
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Trauma

► It is an individual's subjective experience that determines whether an event is or is not traumatic...an event or situation creates psychological trauma when it overwhelms the individual's perceived ability to cope

The Effects of Stress on the Body

Brain becomes more alert

- Stress hormones can affect memory and cause neurons to atrophy and die.
- Headaches, anxiety and depression
- Disrupted sleep

Digestive system slows down.

- Mouth ulcers or cold sores

Adrenal glands produce stress hormones.

- Cortisol and other stress hormones can increase central or abdominal fat
- Cortisol increases glucose production in the liver causing renal hypertension

Skin problems such as eczema and psoriasis

- Effects of chronic or prolonged stress
- Other possible risks of chronic stress

Heart rate increases and blood pressure rises

- Persistently elevated blood pressure and heart rate can increase potential for risk of stroke or heart attack
- Weakening of the heart muscles and symptoms that mimic a heart attack

What happens with brain soup

Love hormone

Promotes good feelings

Oxytocin increase

Strengthen bad memories

Physical

- Chills
- Thirst
- Fatigue
- Nausea
- Twitches
- Vomiting
- Chest pain
- Headaches

- ▶ Children cannot articulate how they feel
- ▶ They can tell us through actions
- ▶ Some adults will do the same thing especially if they have a mental health issue

- ▶ Everyone is different and each of us will react different experiencing the same trauma
- ▶ Our recovery will be different as well

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Cognitive

- Intrusive images
- Blaming someone
- Poor problem solving
- Poor abstract thinking

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Cognitive

- Confusion
- Nightmares
- Uncertainty
- Hypervigilance
- Suspiciousness

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- Elevated blood pressure
- Shock symptoms
- Muscle tremors
- Grinding of teeth
- Visual difficulties
- Difficulty in breathing

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Emotional

- Depression
- Intense anger
- Apprehension
- Emotional shock
- Emotional outbursts
- Feeling overwhelmed
- Loss of emotional control
- Inappropriate emotional responses

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Emotional

- Fear
- Guilt
- Grief
- Panic
- Denial
- Anxiety
- Agitation
- Irritability

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Cognitive

- Poor attention/decisions
- Disorientation, time, place or person
- Poor concentration or memory
- Difficulty in identifying people/objects
- Heighten or lowered alertness
- Increased or decrease awareness of surroundings

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24 to 48 Hours After

- Structure your time, keep busy
- Your feelings are normal
- Talk to people you trust
- Talk to people who care
- Try to maintain normal schedule
- Spend time with others
- Do things that feel good to you
- Give yourself permission to feel rotten

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Behavioral

- Increased appetite
- Hyperalert to environment
- Increased alcohol use
- Increased drug use (legal/illegal)
- Change in usual communications

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Behavioral

- Withdrawal from family, friends, school
- Antisocial acts
- Inability to rest
- Intensified pacing
- Erratic movements
- Change in social activity
- Change in speech patterns
- Loss of appetite

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- What People Helpers Do
- Listen carefully
 - Spend time with traumatized
 - Offer assistance, even they do not ask for it
 - Reassure that he/she is safe
 - Give some private time
 - Don't take person's anger personally
 - Tell you are sorry the event happened and you understand

- Don't make big decisions
- Get plenty of rest
- Eat well balanced meals and drink fluids
- Try and stay from caffeine
- Try to get back to your normal routine
